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Amendments to the Claims

The following Listing of Claims replaces all prior versions, and listings, of claims in the application.

Listing of Claims:

Claim 1 (original): A machine-implemented image processing method, comprising:

computing a respective motion map for each pairing of a reference image and a respective image neighboring the reference image in a sequence of base images, each motion map comprising a set of motion vectors mapping reference image pixels to respective neighboring image pixels;

assigning respective regions of a target image to motion classes based on the computed motion maps, the target image having a target resolution level and the base images having a base resolution level equal to or lower than the target resolution level; and

computing pixel values for the target image based on corresponding pixel value contributions from the base images selected in accordance with the motion classes assigned to the target image regions.

Claim 2 (original): The method of claim 1, wherein computing motion maps comprises generating for each image pair respective dense motion vectors describing motion at pixel locations with respective sets of parameters in a motion parameter space at sub-pixel accuracy.

Claim 3 (original): The method of claim 1, wherein assigning regions of the target image to motion classes comprises assigning pixels of the reference image to respective motion classes and up-projecting the motion class assignments to pixels of the target image.

Claim 4 (original): The method of claim 3, wherein assigning reference image pixels to motion classes comprises computing motion magnitude maps from each motion map, down-sampling the computed motion magnitude maps to a pyramid of motion magnitude maps at

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respective resolution levels lower than the base resolution level, and segmenting pixels in the pyramid of down-sampled motion magnitude maps into motion classes.

Claim 5 (original): The method of claim 4, wherein assigning reference image pixels to motion classes further comprises iteratively segmenting pixels in the pyramid of motion magnitude maps from a coarsest resolution level up to the base resolution level, wherein segmentation from each coarser resolution level is up-sampled to initialize the segmentation at a finer resolution level, and refined by further segmentation at the finer resolution level.

Claim 6 (original): The method of claim 3, wherein assigning reference image pixels to motion classes comprises generating a separate motion class segmentation map for each pairing of the reference image and a respective neighboring image and merging the separate motion class segmentation maps into a unified motion class segmentation map for the reference image.

Claim 7 (original): The method of claim 6, wherein reference image pixels are respectively assigned to a motion class selected from a motion class set including a high motion class and a low motion class, and motion vectors assigned to the high motion class have higher magnitudes than motion vectors assigned to the low motion class.

Claim 8 (original): The method of claim 7, wherein merging the separate motion class segmentation maps comprises

assigning a given reference image pixel to the low motion class in the unified motion class segmentation map when the given pixel is assigned to the low motion class in all of the separate motion class segmentation maps, and

assigning a given reference image pixel to the high motion class in the unified motion class segmentation map when the given pixel is assigned to the high motion class in any of the separate motion class segmentation maps.

Claim 9 (original): The method of claim 8, wherein the motion class set further includes an intermediate motion class, and motion vectors assigned to the intermediate motion class have

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magnitudes higher than motion vectors assigned to the low motion class and lower than motion vectors assigned to the high motion class.

Claim 10 (original): The method of claim 9, wherein merging the separate motion class segmentation maps comprises assigning a given reference image pixel to the intermediate motion class in the unified motion class segmentation map when the given pixel is unassigned to the high motion class in any of the separate motion class segmentation maps and is unassigned to the low motion class in all of the separate motion class segmentation maps.

Claim 11 (original): The method of claim 1, further comprising computing an alignment accuracy map for each pairing of the reference image and a respective neighboring image based on the computed motion maps.

Claim 12 (original): The method of claim 11, wherein computing alignment accuracy maps comprises re-mapping neighboring images to a coordinate frame of the reference image using respective motion maps, and computing correlation measures between pixels of the reference image and pixels of each of the motion-compensated neighboring images.

Claim 13 (original): The method of claim 11, further comprising up-projecting the computed alignment accuracy maps from the base image resolution level to the target image resolution level.

Claim 14 (original): The method of claim 13, further comprising up-projecting the motion maps from the base image resolution level to the target image resolution level, and classifying motion vectors in each up-projected motion map into valid and invalid motion vector classes based on the up-projected alignment accuracy maps.

Claim 15 (original): The method of claim 14, wherein values of target image pixels with corresponding pixels in all neighboring images being associated with motion vectors in the

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invalid motion vector class are computed by interpolating up-projected pixel values of the reference image.

Claim 16 (original): The method of claim 1, further comprising up-projecting the motion maps from the base image resolution level to the target image resolution level.

Claim 17 (original): The method of claim 16, further comprising re-mapping the neighboring images to the reference frame of the up-projected reference image using the respective up-projected motion maps.

Claim 18 (original): The method of claim 1, wherein regions of the target image are respectively assigned to a motion class selected from a motion class set including a high motion class and a low motion class, and motion vectors of regions assigned to the high motion class have higher magnitudes than motion vectors of regions assigned to the low motion class.

Claim 19 (original): The method of claim 18, wherein computing target image pixel values in regions assigned to the high motion class comprises computing a pixel-wise combination of pixel value contributions from the up-projected reference image and the re-mapped neighboring images weighted based on pixel-wise measures of alignment accuracy between the reference image and the corresponding neighboring images.

Claim 20 (original): The method of claim 19, wherein pixel value contributions from the re-mapped neighboring images are additionally weighted based on measures of temporal distance between the reference image and the corresponding neighboring images.

Claim 21 (original): The method of claim 18, wherein computing target image pixel values in regions assigned to the low motion class comprises classifying low motion class reference image pixels and their corresponding pixels in the neighboring images based on measures of local texture richness.

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Claim 22 (original): The method of claim 21, wherein low motion class reference image pixels and their corresponding pixels in the neighboring images are quantitatively evaluated for local texture richness, and are classified into a texture class selected from the texture class set including a high texture region class and a low texture region class, and pixels assigned to the high texture region class have higher local texture measures than pixels assigned to the low texture region class.

Claim 23 (original): The method of claim 22, wherein values of target image pixels classified into the low texture region class in the reference image and all of the respective neighboring images, are computed by interpolating up-projected pixel values of the reference image.

Claim 24 (original): The method of claim 22, wherein a value of a given target image pixel classified into the high texture region class in the reference image or any respective neighboring images is computed based on a pixel value contribution from the up-projected reference image, and a pixel value contribution from a given re-mapped neighboring image weighted based on a measure of local texture richness computed for the given pixel, a measure of motion estimation accuracy computed for the given pixel , and a measure of temporal distance of the neighboring image from the reference image.

Claim 25 (original): The method of claim 18, wherein values of target image pixels are computed based on pixel value contributions from a number of base images neighboring the reference image, the number of neighboring base images being different for different motion classes.

Claim 26 (original): The method of claim 25, wherein values of target image pixels assigned to the high motion class are computed based on pixel value contributions from a fewer number of neighboring base images than the values of target image pixels assigned to the low motion class.

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Claim 27 (original): The method of claim 26, wherein the motion class set further includes an intermediate motion class, the motion vectors of regions assigned to the intermediate motion class have lower magnitudes than motion vectors of regions assigned to the high motion class and higher magnitudes than motion vectors of regions assigned to the low motion class, and values of target image pixels assigned to the intermediate motion class are computed based on pixel value contributions from a fewer number of neighboring base images than the values of target image pixels assigned to the low motion class but a higher number of neighboring base images than the values of target image pixels assigned to the high motion class.

Claim 28 (currently amended): An image processing machine, comprising ~~at least one data processing module operable to~~:

a computer-readable memory storing computer process instructions; and

a computer processor operable to execute the computer process instructions and perform operations comprising

~~compute~~ computing a respective motion map for each pairing of a reference image and a respective image neighboring the reference image in a sequence of base images, each motion map comprising a set of motion vectors mapping reference image pixels to respective neighboring image pixels at sub-pixel accuracy~~;~~,

~~assign~~ assigning respective regions of a target image to motion classes based on the computed motion maps, the target image having a target resolution level and the base images having a base resolution level equal to or lower than the target resolution level~~;~~, and

~~compute~~ computing pixel values for the target image based on corresponding pixel value contributions from the re-mapped base images selected in accordance with the motion classes assigned to the target image regions.

Claim 29 (currently amended): The machine of claim 28, wherein the computer processor ~~at least one data processing module~~ is operable to assign regions of the target image to motion classes by assigning pixels of the reference image to respective motion classes and up-projecting the motion class assignments to pixels of the target image.

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Claim 30 (currently amended): The machine of claim 29, wherein the computer processor~~at least one data processing module~~ is operable to assign reference image pixels to motion classes by computing motion magnitude maps from each motion map, down-sampling the computed motion magnitude maps to a pyramid of motion magnitude maps at respective resolution levels lower than the base resolution level, and segmenting pixels in the pyramid of down-sampled motion magnitude maps into motion classes.

Claim 31 (currently amended): The machine of claim 29, wherein the computer processor~~at least one data processing module~~ is operable to assign reference image pixels to motion classes by generating a separate motion class segmentation map for each pairing of the reference image and a respective neighboring image and merging the separate motion class segmentation maps into a unified motion class segmentation map for the reference image.

Claim 32 (currently amended): The machine of claim 28, wherein the computer processor~~at least one data processing module~~ is operable to compute an alignment accuracy map for each pairing of the reference image and a respective neighboring image based on the computed motion maps.

Claim 33 (currently amended): The machine of claim 32, wherein the computer processor~~at least one data processing module~~ is operable to compute alignment accuracy maps by re-mapped neighboring images to a coordinate frame of the reference image using respective motion maps, and computing correlation measures between pixels of the reference image and pixels of each of the motion-compensated neighboring images.

Claim 34 (currently amended): The machine of claim 33, wherein the computer processor~~at least one data processing module~~ is operable to up-project the computed alignment accuracy maps from the base image resolution level to the target image resolution level.

Claim 35 (currently amended): The machine of claim 34, wherein the computer processor~~at least one data processing module~~ is operable to up-project the motion maps from the

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base image resolution level to the target image resolution level, and classify motion vectors in each up-projected motion map into valid and invalid motion vector classes based on the respective up-projected alignment accuracy maps.

Claim 36 (original): The machine of claim 35, wherein values of target image pixels with corresponding pixels in all neighboring images being associated with motion vectors in the invalid motion vector class are computed by interpolating up-projected pixel values of the reference image.

Claim 37 (currently amended): The machine of claim 28, wherein the computer processor~~at least one data processing module~~ is operable to up-project the motion maps from the base image resolution level to the target image resolution level, and re-map the neighboring images to the reference frame of the up-projected reference image using the respective up-projected motion maps.

Claim 38 (currently amended): The machine of claim 28, wherein:

regions of the target image are respectively assigned to a motion class selected from a motion class set including a high motion class and a low motion class, and motion vectors assigned to the high motion class have higher magnitudes than motion vectors assigned to the low motion class; and

~~at least one data processing module~~the computer processor is operable to compute target image pixel values in regions assigned to the high motion class by computing a pixel-wise combination of pixel value contributions from the up-projected reference image and the respective re-mapped neighboring images weighted based on pixel-wise measures of alignment accuracy between the reference image and the corresponding neighboring images.

Claim 39 (original): The machine of claim 38, wherein pixel value contributions from the re-mapped neighboring images are additionally weighted based on measures of temporal distance between the reference image and the corresponding neighboring images.

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Claim 40 (currently amended): The machine of claim 38, wherein the computer processor~~at least one data processing module~~ is operable to compute target image pixel values in regions assigned to the low motion class based on classification of low motion class reference image pixels and corresponding pixels in the neighboring images based on measures of local texture richness.

Claim 41 (original): The machine of claim 28, wherein values of target image pixels are computed based on pixel value contributions from a number of re-mapped base images neighboring the reference image, the number of neighboring base images being different for different motion classes.

Claim 42 (currently amended): A ~~machine~~computer-readable medium storing ~~machine~~computer-readable instructions operable to cause a computer to perform operations comprising~~for causing a machine to~~:

~~compute~~ computing a respective motion map for each pairing of a reference image and a respective image neighboring the reference image in a sequence of base images, each motion map comprising a set of motion vectors mapping reference image pixels to respective neighboring image pixels at sub-pixel accuracy;

~~assign~~ assigning respective regions of a target image to motion classes based on the computed motion maps, the target image having a target resolution level and the base images having a base resolution level equal to or lower than the target resolution level; and

~~compute~~ computing pixel values for the target image based on corresponding pixel value contributions from the re-mapped base images selected in accordance with the motion classes assigned to the target image regions.

Claim 43 (currently amended): The ~~machine~~computer-readable medium of claim 42, wherein the computer~~machine~~-readable instructions are operable to cause the computer ~~machine~~ to assign regions of the target image to motion classes by assigning pixels of the reference image to respective motion classes and up-projecting the motion class assignments to pixels of the target image.

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Claim 44 (currently amended): The computermachine-readable medium of claim 43, wherein the computermachine-readable instructions are operable to cause the computermachine to assign reference image pixels to motion classes by computing motion magnitude maps from each motion map, down-sampling the computed motion magnitude maps to a pyramid of motion magnitude maps at respective resolution levels lower than the base resolution level, and segmenting pixels in the pyramid of down-sampled motion magnitude maps into motion classes.

Claim 45 (currently amended): The computermachine-readable medium of claim 43, wherein the computermachine-readable instructions are operable to cause the computermachine to assign reference image pixels to motion classes by generating a separate motion class segmentation map for each pairing of the reference image and a respective neighboring image and merging the separate motion class segmentation maps into a unified motion class segmentation map for the reference image.

Claim 46 (currently amended): The computermachine-readable medium of claim 42, wherein the computermachine-readable instructions are operable to cause the computermachine to compute an alignment accuracy map for each pairing of the reference image and a respective neighboring image based on the computed motion maps.

Claim 47 (currently amended): The computermachine-readable medium of claim 46, wherein the computermachine-readable instructions are operable to cause the computermachine to compute alignment accuracy maps by re-mapping neighboring images to a coordinate frame of the reference image using respective motion maps, and computing correlation measures between pixels of the reference image and pixels of each of the motion-compensated neighboring images.

Claim 48 (currently amended): The computermachine-readable medium of claim 47, wherein the computermachine-readable instructions are operable to cause the computermachine

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to up-project the computed alignment accuracy maps from the base image resolution level to the target image resolution level.

Claim 49 (currently amended): The computer~~machine~~-readable medium of claim 48, wherein the computer~~machine~~-readable instructions are operable to cause the computer~~machine~~ to up-project the motion maps from the base image resolution level to the target image resolution level, and classify motion vectors in each up-projected motion map into valid and invalid motion vector classes based on the respective up-projected alignment accuracy maps.

Claim 50 (currently amended): The computer~~machine~~-readable medium of claim 49, wherein values of target image pixels with corresponding pixels in all neighboring images being associated with motion vectors in the invalid motion vector class are computed by interpolating up-projected pixel values of the reference image.

Claim 51 (currently amended): The computer~~machine~~-readable medium of claim 42, wherein the computer~~machine~~-readable instructions are operable to cause the computer~~machine~~ to up-project the motion maps from the base image resolution level to the target image resolution level, and re-map the neighboring images to the reference frame of the up-projected reference image using the respective up-projected motion maps.

Claim 52 (currently amended): The computer~~machine~~-readable medium of claim 42, wherein:

regions of the target image are respectively assigned to a motion class selected from a motion class set including a high motion class and a low motion class, and motion vectors assigned to the high motion class have higher magnitudes than motion vectors assigned to the low motion class; and

the computer~~machine~~-readable instructions are operable to cause the computer~~machine~~ to compute target image pixel values in regions assigned to the high motion class by computing a pixel-wise combination of pixel value contributions from the re-mapped neighboring images

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weighted based on pixel-wise measures of alignment accuracy between the reference image and the corresponding neighboring images.

Claim 53 (currently amended): The computer~~machine~~-readable medium of claim 52, wherein pixel value contributions from the re-mapped neighboring images are additionally weighted based on measures of temporal distance between the reference image and the corresponding neighboring images.

Claim 54 (currently amended): The computer~~machine~~-readable medium of claim 52, wherein the computer~~machine~~-readable instructions are operable to cause the computer~~machine~~ to compute target image pixel values in regions assigned to the low motion class based on classification of low motion class reference image pixels and corresponding pixels in the neighboring images based on measures of local texture richness.

Claim 55 (currently amended): The computer~~machine~~-readable medium of claim 42, wherein values of target image pixels are computed based on pixel value contributions from a number of re-mapped base images neighboring the reference image, the number of re-mapped neighboring base images being different for different motion classes.